

# Emotional intelligence in orthopedic surgery residents

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**Background:** Emotional intelligence (EI) is the ability to understand and manage emotions in oneself and others. It was originally popularized in the business literature as a key attribute for success that was distinct from cognitive intelligence. Increasing focus is being placed on EI in medicine to improve clinical and academic performance. Despite the proposed benefits, to our knowledge, there have been no previous studies on the role of EI in orthopedic surgery. We evaluated baseline data on EI in a cohort of orthopedic surgery residents.

**Methods:** We asked all orthopedic surgery residents at a single institution to complete an electronic version of the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT). We used completed questionnaires to calculate total EI scores and 4 branch scores. Data were analyzed according to a priori cutoff values to determine the proportion of residents who were considered competent on the test. Data were also analyzed for possible associations with age, sex, race and level of training.

**Results:** Thirty-nine residents (100%) completed the MSCEIT. The mean total EI score was 86 (maximum score 145). Only 4 (10%) respondents demonstrated competence in EI. Junior residents ( $p = 0.026$ ), Caucasian residents ( $p = 0.009$ ) and those younger than 30 years ( $p = 0.008$ ) had significantly higher EI scores.

**Conclusion:** Our findings suggest that orthopedic residents score low on EI based on the MSCEIT. Optimizing resident competency in noncognitive skills may be enhanced by dedicated EI education, training and testing.

**Contexte :** L'intelligence émotionnelle (IÉ) est la capacité de comprendre et de gérer les émotions qui se manifestent en soi-même et chez les autres. À l'origine, le concept d'IÉ a été popularisé dans le monde des affaires en tant qu'attribut clé de la réussite, distinct de l'intelligence cognitive. On s'intéresse de plus en plus à l'IÉ pour améliorer l'acquisition des compétences cliniques et théoriques. Or, malgré les avantages évoqués, à notre connaissance, aucune étude n'a encore porté sur le rôle de l'IÉ en chirurgie orthopédique. Nous avons évalué les données de base concernant l'IÉ d'une cohorte de résidents en chirurgie orthopédique.

**Méthodes :** Nous avons demandé à tous les résidents en chirurgie orthopédique d'un seul établissement de répondre à un questionnaire par voie électronique, soit le test d'intelligence émotionnelle de Mayer–Salovey–Caruso (MSCEIT). Nous avons utilisé les questionnaires dûment remplis pour calculer les scores d'IÉ totaux et 4 scores secondaires. Les données ont été analysées en fonction de valeurs-seuils préalablement établies afin de déterminer la proportion de résidents jugés compétents à l'aune de ce test. Les données ont aussi été analysées en fonction de liens possibles avec l'âge, le sexe, la race et le niveau de formation.

**Résultats :** Trente-neuf résidents (100 %) ont répondu au test MSCEIT. Le score d'IÉ total moyen a été de 86 (score maximum 145). Seuls 4 répondants (10 %) ont démontré une compétence en matière d'IÉ. Les résidents juniors ( $p = 0,026$ ), de race blanche ( $p = 0,009$ ) et de moins de 30 ans ( $p = 0,008$ ) ont présenté des scores d'IÉ significativement plus élevés.

**Conclusion :** Selon nos conclusions, les résidents en orthopédie obtiennent des scores faibles pour ce qui est de l'IÉ selon le test MSCEIT. Il serait possible d'améliorer les compétences non cognitives des résidents au moyen de cours, de stages et de tests d'IÉ.

Emotional intelligence (EI) can be summarized as the ability to recognize, understand and manage emotions in oneself and others.<sup>1</sup> Since 1998, EI has gained significant importance in the business literature as a fundamental tool for success and leadership.<sup>2</sup> The concepts, however, apply to the field of medicine as well. In a systematic review of 16 articles examining EI in medicine, Arora and colleagues<sup>3</sup> found that greater EI correlated with improved doctor–patient relationships, empathy, teamwork and communication skills. There have also been some suggestions that EI represents the closest available tool to measure the emotional competence of physicians.<sup>4</sup> These attributes align nicely with contemporary medical education, which aims to train physicians who possess not only the expert knowledge and skills to practise medicine within their specialties, but also the ability to demonstrate competence in noncognitive characteristics.<sup>5,6</sup> Efforts to define and assess such noncognitive skills of a trainee have resulted in educational frameworks, such as the CanMeds roles in Canada. The initiative was developed in the 1990s and identifies 7 core competencies of a qualified physician, including medical expert, communicator, collaborator, manager, health advocate, scholar and professional.<sup>7</sup>

Despite the proposed benefits, to our knowledge, there has been no previous work done in applying EI to an orthopedic surgery residency curriculum. To study EI as a potential educational tool, we first sought to determine the baseline EI among a cohort of surgical residents at an academic institution in Canada.

**METHODS**

*Study participants*

We recruited all orthopedic surgery residents (postgraduate year [PGY]1–5) at a single institution to complete the online version of the Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT), a validated measure of EI.<sup>1</sup> Our decision to include only orthopedic surgery residents was based on a focused effort within the division to improve communication skills. Our institutional review board approved this study.

*Determining EI*

The MSCEIT is the product of efforts made by academics at Yale and the University of New Hampshire to advance the notion of EI.<sup>1</sup> It is a validated and reliable measure of EI that is meant to apply to a wide variety of settings, such as research, corporate, educational, clinical and medical fields.<sup>1</sup> The MSCEIT contains 141 items. The questions aim to assess how well respondents aged 17 years or older perform on emotional problems that are similar to everyday tasks; the tool does not ask respondents

to subjectively assess their emotional skills.<sup>1</sup> The costs per administration are about \$7 with a research discount or \$50 without it.<sup>8</sup>

Prior to completing the questionnaire, respondents were asked to enter demographic information, including age, sex, race and PGY of training. Owing to data limitations of the questionnaire, race could only be recorded as Caucasian, Asian or other. “Caucasian” referred to participants of European or North American background, and “Asian” referred to those from an Oriental background. The “Other” category generally comprised respondents other than those in the former 2 groups. Completed questionnaires were then sent electronically to the publishers for scoring, generating a total EI score and 4 branch scores: perceiving emotions, facilitating thought, understanding emotions and emotional management.

*Statistical analysis*

The MSCEIT assesses a respondent’s level of correctness based on a normative sample of 5000 people.<sup>1</sup> Although most of the data come from participants in the United States, there were a number of collaborating sites from other countries, including Canada, the United Kingdom, South Africa, Australia, the Philippines, India and Sri Lanka.<sup>1</sup> Scores are positioned on a normal curve with an average score of 100, standard deviation (SD) of 15 and a maximum score of 145.<sup>1</sup> The MSCEIT offers guidelines on how to interpret the computed scores;<sup>1</sup> they are shown in Table 1. Using the MSCEIT criteria, we narrowed the categories into 2 representative groups: scores of 110 or greater were classified as “competent” and scores of 109 or less were classified as “consider improvement.”

For each branch score and for the total EI score, we reported the number of residents who were “competent.” We calculated means, medians and SDs for total EI scores and the 4 branch scores. We also sought to determine whether there were differences in total EI scores and age, sex, race and PGY of training. Analyses were performed using a *t* test for comparison. We considered results to be significant at *p* < 0.05. Age was dichotomized a priori as younger than 30 years or 30 years and older. Similarly, race was grouped as Caucasian or other, and

**Table 1. Suggested interpretation of computed emotional intelligence scores**

| Score range | Interpretation       |
|-------------|----------------------|
| ≤ 69        | Consider development |
| 70–89       | Consider improvement |
| 90–99       | Low average score    |
| 100–109     | High average score   |
| 110–119     | Competent            |
| 120–129     | Strength             |
| ≥ 130       | Significant strength |

PGY of training was divided into junior (PGY1–2) and senior (PGY3–5). We performed a multiple regression analysis on these same variables.

## RESULTS

### Participants

A total of 39 residents completed the questionnaire, 36 men (92%) and 3 women (8%), for a response rate of 100%. There were 5 PGY1, 6 PGY2, 9 PGY3, 6 PGY4 and 13 PGY5 residents. There were 14 Caucasian (36%) and 5 Asian (13%) residents, while the remaining 20 (51%) residents were grouped into the “other” category by the MSCEIT. Eighteen (46%) respondents were aged 20–29 years, 18 (46%) were aged 30–39 years and 2 (5%) were aged 40 years and older (1 respondent did not provide information on age).

### Emotional intelligence scores

Table 2 shows the number of residents who scored within the competent range on the MSCEIT in the total EI score and the 4 branch scores. Table 2 also shows the number of respondents who required improvement or scored within the average range on the questionnaire. Overall, only 4 residents (10%) surveyed were considered competent in the total EI score on the MSCEIT. Table 3 shows the means, medians and SDs for the total EI score and 4 branch scores. The mean total EI score in our sample was 86 (median 91, SD 22).

**Table 2. Emotional intelligence scores among residents**

| Emotional intelligence | Group; no. (%) |         |                      |
|------------------------|----------------|---------|----------------------|
|                        | Competent      | Average | Requires improvement |
| Total score            | 4 (10)         | 18 (46) | 35 (90)              |
| Perceiving emotions    | 7 (18)         | 14 (36) | 32 (82)              |
| Facilitating thought   | 5 (13)         | 14 (36) | 34 (87)              |
| Understanding emotions | 3 (8)          | 24 (62) | 36 (92)              |
| Managing emotions      | 3 (8)          | 20 (51) | 36 (92)              |

**Table 3. Summary measures for emotional intelligence testing using the MSCEIT**

| Emotional intelligence | Mean | Median | SD |
|------------------------|------|--------|----|
| Total score            | 86   | 91     | 22 |
| Perceiving emotions    | 88   | 92     | 24 |
| Facilitating thought   | 87   | 88     | 20 |
| Understanding emotions | 91   | 97     | 18 |
| Managing emotions      | 89   | 93     | 17 |

MSCEIT = Mayer-Salovey-Caruso Emotional Intelligence Test; SD = standard deviation.

### Analysis of factors associated with EI

There were significantly higher mean total EI scores among junior residents ( $p = 0.026$ ), Caucasian residents ( $p = 0.009$ ) and those younger than 30 years ( $p = 0.008$ ). However, there was no significant difference in scores between men and women ( $p = 0.91$ ; Table 4). Using regression analysis, these variables accounted for 25.2% of the variance in the total EI scores ( $r^2 = 0.252$ ).

## DISCUSSION

Among our cohort of orthopedic surgery residents, most required improvement in EI based on the MSCEIT. In fact, 90% of respondents did not meet the numerical threshold for competence on this questionnaire. The dimensions of the test further suggested that residents had difficulty in all 4 branches of the MSCEIT: perceiving emotions, facilitating thought, understanding emotions and emotional management. This finding raises some potential concerns in light of the current climate of medical practice, where communication and teamwork are increasingly more important as medical complexity and multidisciplinary care become more prevalent. Previous research has demonstrated the potential significance of EI in clinical outcomes. Particularly, EI is recognized to be positively correlated with improved doctor–patient relationships and trust.<sup>9,10</sup> Stratton and colleagues<sup>11</sup> also found that EI was positively associated with communication skills in medical students undertaking a clinical performance exam. In the occupational health literature, EI has been found to be related to less burnout and higher job satisfaction among 110 internists.<sup>12</sup>

### Limitations

It is important to remember that the present study is only a descriptive, cross-sectional, exploratory analysis of EI in

**Table 4. Factors associated with emotional intelligence scores**

| Factor            | Mean total score (no. of respondents) | $p$ value |
|-------------------|---------------------------------------|-----------|
| Sex               |                                       | 0.91      |
| Male              | 86 (36)                               |           |
| Female            | 87 (3)                                |           |
| Age, yr           |                                       | 0.008     |
| < 30              | 96 (18)                               |           |
| ≥ 30              | 77 (20)                               |           |
| Level of training |                                       | 0.026     |
| Junior            | 98 (11)                               |           |
| Senior            | 81 (28)                               |           |
| Race              |                                       | 0.009     |
| Caucasian         | 98 (14)                               |           |
| Other             | 79 (25)                               |           |

1 group of orthopedic surgery residents. Our study is limited by its small sample size and lack of comparison groups, including faculty members, divisional and departmental leaders and residents in other surgical or medical specialties. In addition, there made no comparisons between MSCEIT scores and resident performance on other standardized evaluations, such as in-training tests, faculty assessments or Royal College exams. These additional comparisons would have provided interesting insight into the potential predictive ability of MSCEIT scores and resident success or, conversely, the possibility that surgeons score poorly on the MSCEIT, but perform better on other tests. As a result, our findings are not meant to draw any firm conclusions regarding the MSCEIT as an assessment tool for resident performance or as a predictor of orthopedic outcomes. Rather, they are intended to stimulate further research in EI as an additional marker of physician competence. This will require progressive steps, but there may be multiple ways to further explore EI. For instance, as mentioned previously, EI measures can be compared among different groups and correlated with other markers of physician success. There can also be longitudinal studies that measure EI repeatedly over time, which may permit a more powerful analysis of changes in EI within the existing surgical curricula. Finally, specific educational initiatives directed at improving EI may allow investigators to explore potential changes. Ultimately, these focused research efforts are aimed at enhancing physician competence and patient care.

Another intimate issue that needs clarification in future research is the concept of plasticity in EI. Previous work has shown that EI may not be a static personal attribute. Satterfield and colleagues<sup>13</sup> measured EI in a group of 28 internal medicine residents at baseline and 1 year later. The authors found that EI scores increased significantly over the course of a year.<sup>13</sup> Although the data are correlational in nature and may have been affected by confounding factors, such as maturation or life experiences, the authors proposed that the changes could have been secondary to direct educational interventions focusing on communication skills and empathy.<sup>13</sup> Research on EI development and training are lacking. Some authors have suggested that emotional skills should be regarded as physical exam skills, which can be longitudinally taught using clinical cases, patient contact, precepting experiences and mentorships.<sup>4</sup> Prospective studies are needed to determine the changes in EI, if any, associated with specific educational initiatives focused on emotional skills.

Our study also has several important strengths. First, the use of the MSCEIT as a measure of EI is strengthened by evidence of sound validity and reliability.<sup>1</sup> This is particularly important since there is no gold standard for the assessment of EI. The questionnaire is also a relatively objective, ability-based test of EI, which avoids the potential subjectivity of other self-reported tests that ask respondents to rate their own emotional skills.<sup>1</sup> In addition, the

MSCEIT was administered electronically, and scoring was performed independently by the publishers. This avoids the potential errors and bias that may be introduced if we had completed the scoring manually ourselves.

The present study has also demonstrated some interesting trends. We found a significantly higher mean total EI score among junior residents and those younger than 30 years. Although our small sample size may limit the generalizability of this finding, our result is similar to those of other studies.<sup>14,15</sup> Jensen and colleagues<sup>14</sup> hypothesized that the decline in EI that they observed may have been related to the stresses and structure of surgical residency training.<sup>14</sup> Further studies with larger sample sizes and repeated EI measures are required to clarify this trend and identify potential areas for intervention.

We also found that there was a significantly higher EI score among Caucasian respondents than Asian or other respondents. Unfortunately, the MSCEIT did not provide an opportunity for the 20 “other” respondents (51%) to elaborate on their racial backgrounds, which would have provided a clearer and more specific description of a substantial proportion of the study cohort. The tool also ignores the possibility of cross-cultural experiences; for example, a Caucasian respondent could have been brought up in Asia. Nevertheless, the potential for bias due to cultural and language differences are not unreasonable. Although the MSCEIT places no restrictions on racial applicability (performance on the questionnaire was considered comparable among racial groups in the normative sample), it is still worth noting that these data were collected from mostly U.S. cities and 58.6% of the normative sample was classified as “Caucasian.”<sup>1</sup>

## CONCLUSION

We identified a deficiency in EI among a cohort of orthopedic surgery residents. Emotional intelligence is an attractive model for defining and training future orthopedic surgeons in noncognitive competencies, such as communication, teamwork and professionalism. Overall, our findings are important in generating hypotheses for further work on EI. Future studies should focus on using reliable and validated measures of EI with larger sample sizes and rigorous study designs to evaluate the associations between EI and clinical and academic outcomes as well as the changes associated with EI-specific educational interventions.

**Competing interests:** None declared.

**Contributors:** All authors designed the study. K. Chan acquired and analyzed the data, which M. Bhandari also analyzed. K. Chan wrote the article, which all authors reviewed and approved for publication.

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